CANCER OF THE TESTIS *

CONTAINING A REPORT OF 64 CASES, WITH SPECIAL REFERENCE TO 12 CASES OF CANCER OF THE UNDESCENDED TESTIS

By William B. Coley, M.D.
of New York

PROFESSOR OF CLINICAL SURGERY, CORNELL MEDICAL SCHOOL; ATTENDANT SURGEON TO THE GENERAL MEMORIAL HOSPITAL FOR CANCER AND ALLIED DISEASES; ATTENDANT SURGEON TO THE HOSPITAL FOR RUPTURED AND CRIPPLED

Whether the undescended testicle is more liable to be the seat of malignant disease than the normally descended testicle, is a question that has never been fully settled. The opinion generally held is that the undescended testicle is much more likely to become malignant than the normally descended testicle. The most comprehensive study of this question in recent times is that of Dr. Kenneth Bulkley of New York, on "Malignant Disease of the Testicle Retained Within the Abdominal Cavity" (*Surgery, Gynæcology and Obstetrics,* vol. 17). Literature on this subject is exceedingly meagre.

Blanck's collection in 1906 showed only 19 cases of malignant tumors of the testicle, but Bulkley has collected 57 cases from the literature, and to this he has added 2 hitherto unreported cases from the Presbyterian Hospital of New York, making a total of 59 cases of sarcoma of the abdominal variety of ectopia.

Bulkley states that for years it has seemed to be a surgical superstition that the testicle retained within the abdominal cavity is prone to undergo malignant degeneration. Many of the older writers, Dupuytren, Arnot, Gowers, Lecompte, Godard, and Spry, had called attention to it before Johnson in 1859 put the first case on record. Godard, however, records a very remarkable personal experience, stating that he has observed 8 monorchids suffering from sarcoma, in 7 of which the disease had occurred in the undescended testicle, and in the eighth, in the normally descended testicle. He gives, however, no detailed report of the cases.

Bulkley found no cases reported prior to 1859, and only 57 since that time in the medical literature of France, Germany, Russia, Italy, and the English-speaking races. He attempts to estimate the relative frequency of the condition from the various statistics, and quotes Eccles' analysis of 60,000 male admissions to The London Hospital,

* Read before the Southern Surgical and Gynæcological Association, December 15, 1914.

showing 38 cases of sarcoma of the testis, of which, one occurred in the undescended testicle.

Howard found in 110,000 male patients admitted to various London hospitals during a period of twenty years, 65 cases of malignant disease of the testis, of which 9 occurred in the ectopic testicle, all of the inguinal variety, and none of the abdominal. Bulkley adds new data derived from a record of 12,729 consecutive male admissions to the Presbyterian Hospital of New York, giving 13 examples of malignant tumor of the testis, of which 11 were situated in the scrotum, and 2 in the abdomen. Combining these statistics we find that of 182,729 male admissions to general hospitals, there were 116 cases of sarcoma of the testicle, of which 12 occurred in the undescended testicle, only 3 of these occurring in the intra-abdominal testicles, or about one in each 60,000 cases.

At the Hospital for Ruptured and Crippled, from 1890–1907, in 59,235 cases of inguinal hernia in the male sex there were found 737 cases of undescended testis, without a single case of sarcoma of the undescended testis. However, it should be noted that the statistics of the Hospital for Ruptured and Crippled, or of any large hernia clinic, do not give a fair estimate of the relative proportion of cases of sarcoma of the undescended testicle, inasmuch as many of these cases, particularly those of abdominal ectopia, will seek relief at some general hospital rather than go to a hospital devoted specially to the treatment of hernia. My own personal statistics throw, perhaps, some further light upon this question. During the past twenty-five years, I have personally observed 65 cases of sarcoma of the testicle. The first 25 of these cases occurred in the normally descended testicle; in the next two cases, however, the disease occurred in the undescended testicle. On going over my entire statistics I find that in 52 cases the disease occurred in the normally descended testicle and in 12 cases, in the undescended testicle.

Different writers give different opinions as to the relative frequency of cancer of the normally descended and mal-descended testes. Shoedel encountered 5 cases of cancer of the inguinal testicle compared with 36 cases of cancer of the normally placed organ; Odiorne and Simmons, in a review of 54 cases of malignant disease of the testicle observed at the Massachusetts General Hospital, found 6 or 11 per cent. in which the disease occurred in the undescended testes; of these, 4 were in the abdominal cavity, and 2 in the inguinal canal. Rademacher gives the proportion of malignant abdominal to malignant inguinal testicle, as 1 to 8. Meiser found 64 malignant inguinal as against 4

abdominal testes. Bulkley, himself, however, found at the Presbyterian Hospital 2 cases of malignant abdominal in 12 cases of malignant inguinal testes. An analysis of these cases encountered by Chevassu, Odiorne and Simmons, and the Presbyterian Hospital records, show the proportion as 1 to 5. My own statistics show almost the same proportion: 12 undescended in a total of 64 cases of sarcoma of the testis, or about 1–5½.

The influence of trauma upon the development of sarcoma of the undescended testicle is less clear than in the case of the normally descended testicle. Bulkley states that only 2 cases of the abdominal type gave a history of direct trauma. He mentions the possibility of trauma from the contraction of the abdominal muscles as a factor in those cases in which the testicle lies at, or near, the internal ring.

As regards the age of development, 42 or a little over 75 per cent. occurred between the ages of twenty-five and forty-five years. This shows that the age of development of sarcoma of the normally descended testicle is practically the same as that of the undescended testicle as shown by Kober, who found that 71 per cent. of 114 cases of scrotal sarcoma of the testis occurred between the ages of 20 and 50 years.

As to the pathology of Bulkley's 59 collected cases,

20 were classed as sarcoma.
10 were classed as round-celled sarcoma.
6 were classed as large round-celled sarcoma.
1 was classed as spindle-celled sarcoma.
1 was classed as mixed sarcoma.
1 was classed as myxosarcoma.
1 was classed as cystic sarcoma.
2 were classed as teratoma.
2 were classed as epithelioma.
2 were classed as chorio-epithelioma.
7 were classed as carcinoma.
1 was classed as rhabdomyoma.
5 were classed as cancer.

59

The Clinical Diagnosis of Cancer of the Undescended Testis.—If the testis is in the inguinal canal, or inside or just outside of the ring, it is possible to make a fairly early diagnosis, the signs or symptoms being not unlike those found in connection with sarcoma of the normally descended testicle. If, however, the testis is situated in the abdominal cavity, the diagnosis is rarely made until the disease has reached a fairly advanced stage. Acute abdominal pain is often the

earliest symptom. Usually there is a history of dull, dragging pain in, or over, the iliac fossa. If the trouble is on the right side it is not infrequently mistaken for appendicitis. In several cases I have known operation to have been performed in the belief that the condition was that of appendicitis. After a few weeks—in some cases months—these irregular symptoms are usually followed by the appearance of smooth, ovoid or round tumor in the lower iliac fossa, more or less tender on pressure. In some cases slight fever accompanies the condition; the temperature is usually normal. Sometimes the condition becomes so far advanced before a diagnosis is made, that marked swelling of the leg occurs, accompanied by severe lumbar pain. Bulkley's statistics show 4 cases of strangulation with twisted pedicle to have taken place, in all of which there was an acute onset with abdominal pain, fever, nausea, vomiting, and objective signs of an acute abdominal lesion. In most cases the tumor is fairly well fixed and not very movable.

Furthermore, Bulkley found only 9 cases in which the presence or absence of offspring was definitely noted. Five of these were single cryptorchids, and were fathers of children; four had no children, only one of the latter being a double cryptorchid. Bulkley states that not a single case of double cryptorchid with malignant testicle has as yet been reported as having offspring. This statement will have to be modified since the publication of McGlannon's paper, read before the Southern Surgical and Gynæcological Association, at Atlanta, Ga., December, 1913.

Differential Diagnosis.—The first and most important step in the diagnosis is a careful examination of the scrotum with a view to determining the presence or absence of a normally descended testicle. This, however, has been omitted in many of the recorded cases. Before the disease has advanced sufficiently to form a palpable mass, it may be very difficult to make a diagnosis, as the condition cannot be easily differentiated from that of renal colic, appendicitis, or cæcal tumors. If the testes cannot be found either in the scrotum or inguinal canal, and a tender mass is felt in the lower iliac fossa, giving rise to the symptoms already mentioned, the chances are very strong that one is dealing with a malignant ectopic testicle.

Tuberculosis of the abdominal testis is remarkably rare, as is likewise acute inflammation of the abdominal testicle.

There have been found a few cases of abdominal orchitis of gonorrhœal origin, but no case of syphilitic abdominal orchitis has as yet been reported.

Prognosis.—The prognosis in these cases is exceedingly bad, due

apparently to the fact that an early diagnosis is at present seldom made. In five cases the nature of the condition was not recognized until an autopsy was performed.

The results in Bulkley's 59 collected cases show the gravity of the condition. In 37 cases excision was done, with an operative mortality of 10 per cent. Of the remaining 22 cases, 18 only were traced. Seven cases remained well, but in the majority of these, the interval of time which elapsed between the operation and the date of report is much too short to draw any conclusions as to a permanent cure. Only one patient out of the 37 was well over three years, and but three remained well over two years.

The question of prophylactic treatment is an important one, inasmuch as it may mean the removal of a testis before a malignant growth has occurred. Bulkley believes, that from present statistics we can roughly state that one in every 75 abdominal testes will become malignant. In his opinion, if the individual has one testicle in the scrotum, the abdominal testis should, after puberty, be removed. He states that 37 of the collected cases were single cryptorchids developing malignancy in the abdominal testicle, and that all would have been saved had an abdominal orchidectomy been done before the onset of malignancy, that is, shortly after puberty. In the case of a double abdominal cryptorchid, operation would not be advisable except in the presence of objective signs.

Bulkley's argument is based upon the assumption which he believes to have been proven by statistics, that one in every 75 abdominal testes will become malignant. Personally I do not believe that we have sufficient data at present to warrant us in accepting this estimate. I believe it is much too high. Inasmuch as the condition is usually associated with a hernia, I believe it justifiable to operate, and only in those cases in which it is found impossible to bring the testicle down into the scrotum, would I sacrifice the testicle. My series of cases shows that the trauma incident to the operation of bringing down the testis into the scrotum, may have been the exciting cause of the sarcoma in at least one case.

Bilateral sarcoma of the undescended testes is exceedingly rare. Bulkley's collection of 59 cases shows only two examples, to which has been added one case by Dr. Oliver C. Smith of Hartford, Conn. (*Boston Medical and Surgical Journal,* May 28, 1914, page 839, vol. clxx). A careful search of the literature by Dr. Smith failed to find any other cases.

A brief history of his case is as follows:

Male, aged thirty-eight, farmer, white, married, no children. Both testes absent since birth. Eight years previous, patient had suffered from painful swellings in both inguinal canals, following an attack of mumps. Two months before operation he noticed enlargement in both inguinal canals, followed by rapid growth and considerable pain on one side.

Physical examination, at the time of operation, July 10, 1913, showed both iliac fossæ and inguinal canals occupied by large fluctuant tumors, the right extending from the upper margin of the scrotum to above the umbilical line. The tumor upon the left side occupied the inguinal canal and was less tense. Both testes were absent from the scrotum. Operation revealed an enormous fusiform cyst of the tunica vaginalis, containing 75 c.c. of clear straw-colored fluid. In the upper portion was a hard, irregular mass. The tissues of the cord, including the vessels and lymphatics, were dissected beyond the internal ring; the vas deferens was followed as far down as possible toward the pelvis and removed. A similar operation was performed on the left side, at which time about half the amount of fluid as was found on the right side was removed, together with a malignant testicular tumor. The operation was followed by but little reaction, and primary union resulted. The pathological report made by Dr. John Carter Rowley (pathologist at the Hartford Hospital) read: "Large, round-celled sarcoma of each organ."

Recurrence followed in 8 months and death shortly afterward.

I have another case to add which will be found in my report of cases.

The Duration of Life in Cancer of the Testis (Scrotal Cases).—Cancer of the testis must be looked upon as a particularly malignant type of cancer and the course of the disease is considerably shorter than in most other types. My own series of cases shows that in 48 of the fatal cases in 29 the duration of life was one year or less. In every one of the 6 cases in which it was over three years, the toxins had been used. In one case of five years' duration, it was stated that the tumor had existed four years before operation. In this case it is possible that the tumor was not malignant during the entire period, but a malignant degeneration occurred in an older and originally benign process.

The duration of life in cancer of the undescended testis is worthy of special note, it being much shorter than in the ordinary scrotal type, varying from 3 months to 8 years. In 7 of the 12 cases death occurred within less than one year from the beginning of the first symptom. Only 3 cases lived over 3 years, one 3½, one 6, and one 8 years, and in all of the latter the mixed toxins were used after operation.

Chevassu's statistics show the duration of life in fatal cases to be as follows:

Unknown in	15 cases.
15 days to 1 year	38 cases.
1 to 2 years	17 cases.
2 to 3 years	9 cases.
3 to 4 years	2 cases.

In other words, death occurred before three years in nearly all of the cases, and in 74 per cent. death occurred one year after operation.

Chevassu in an important paper on The Surgical Treatment of Cancers of the Testicle (*Rev. de Chir.*, vol. 41, 1910) has made the first attempt along scientific lines to ascertain the actual results following the surgical treatment of cancer of the testicle. Beginning in 1894 he gradually collected a statistic based only upon tumors of the testicle in which the same histological examination was practised, and in 1908 he published an elaborate paper on Cancer of the Testicle (*Theses de Paris*) in which he reported 85 cases. His later work (*loc. cit. Rev. de Chir.*) contained 100 cases.

Chevassu calls attention to the extremely pessimistic views as to the curability of cancer of the testis, expressed by classical writers, and still held by the great majority of modern surgical authorities, *e.g.*:

Reclus (Duplay and Reclus, 2nd edition, T. vii, 1899), who states that malignant tumors of the testicles are not only fatal, but are so rapidly fatal that one almost always asks the question if operation may not hasten generalization.

Sebileau (Le Dentu et Delbet, T. 10, 1901, p. 241): "Notwithstanding one hastens to perform castration, it seems almost always too late, inasmuch as a recurrence, and an apparently rapid one, uniformly follows."

Arrou (Richard et Rochard, *Chir. de. l'appareil genital de l'homme,* 1901, p. 239): "Castration has never cured an individual suffering from cancer of the testicle."

Monod and Terrillon (*Traité des maladies du testicle,* 1889, p. 619): "Castration does not give any general hope of life to patients operated upon."

Other well-known authorities such as, Paget, Curling, Kocher, Le Dentu, Duplay, Most, Chalot, etc., might be quoted to confirm the same opinion. Chevassu states that they all admit the constancy of recurrence, and, in regard to the few examples of cure that have been published, they regard it is so exceptional as to make it possible to question the exactness of the diagnosis. Pousson (*Gaz. hebd. des Sc. méd. de Bordeaux,* September 12, 1909) expresses an even more pessimistic opinion as to the hopeless prognosis of tumors of the testicle. He states: "Sarcoma may sometimes be cured, but epithelioma, never. For my part, I have never seen a cure. I consider an attempt to remove the abdominal glands as useless. I do not believe that the search for the glands in any way improves the results."

American authorities, *e.g.*, Dr. Bevan (*Keen's System of Surgery*) who expresses the same opinion, and states that he has never seen a cure, no matter how early operations were performed.

Chevassu's statistics, based upon 100 cases, very carefully collected and analyzed, prove that these gloomy views are not in entire accord with the actual facts. The operative prognosis of cancer of the testicle, while still very grave, is not as bad as it has been pictured. Instead of an occasional patient surviving operation, and this being explained as a mistake in the diagnosis,

Chevassu shows that in 100 cases, in which there can be no question as to the diagnosis of malignancy, 19 patients were found alive and well from 4 to 10 years after operation. A study of the histological type of these cases of survival is of great interest. He classes them as follows:

Of 47 cases described as "epithelioma seminal" 16 were cured; that is, well from 4 to 10 years.

Of 50 cases classed as "mixed tumors" only three were cured.

Of the 3 remaining cases classed as "sarcoma" all died.

The more one studies the recent attempts of the pathologists to classify malignant tumors of the testicle into a large number of distinct groups, the more futile seem such attempts, inasmuch as each one of the many types depends upon the histological character and arrangement of the cells, which is differently interpreted by nearly every observer. For example, take the two most recent, and by far most important, contributions to the study of tumors of the testicle, published by Chevassu (*loc. cit.*) and Ewing ("Teratoma of the Testis, and Its Derivatives," *Surgery, Gynæcology, and Obstetrics,* March, 1911).

Ewing believes that practically all cases of malignant tumor of the testicle should be classified as teratomas, or carcinomas derived from teratomas.

Of the 100 cases of Chevassu, he classes only one as a teratoma. He classifies his cases thus; as: 1. Epithelioma seminal or seminoma, 47 cases. 2. Sarcoma (rare), 3 cases. 3. Mixed tumors, 50 cases. As regards his group of so-called "mixed tumors," 50 out of a total of 100, he subdivides them as follows:

(1) Teratomas, or tumors benign.

(2) Tumors properly called "mixed tumors," polymorphomes, or heteromorphomes. These tumors are originally benign, but later assume a tendency to degeneration.

(3) Epitheliomas, sarcomas, placentomes, etc., in which one no longer finds remains or mixed tumors (cartilage, muscles, etc.) but which have absolutely the same structures as certain malignant degeneration of malignant mixed tumors.

In regard to teratomas, Chevassu states that they are usually benign, but susceptible to malignant degeneration. Of 6 teratomas, in which he followed up the after history, only one presented microscopical manifestations of degeneration, and this alone proved fatal.

Ewing in his paper presents a very lucid and exhaustive study of tumors of the testis, particularly bearing upon the etiology of such tumors. He calls attention to the fact that the formerly extensive group of sarcomas has been narrowed by the elimination of many cases of carcinoma which were once regarded as alveolar sarcoma.

Ewing advances the view that practically all malignant tumors of the testicle originate from a pre-existing teratoma, and he takes issue with Chevassu, who believes that his class designated as "seminoma" originate from the epithelial cells of the seminal tubules and are entirely unrelated to teratoma.

I have neither the requisite knowledge, nor is this the proper place to discuss the relative merits of these opposing theories. I wish merely to point out that before entirely accepting Ewing's conclusions much additional evidence must be offered. The most important objection to this theory is, that in a very large number of cases of cancer of the testicle no teratomatous elements are found. Ewing explains the absence of these elements by assuming that a preëxisting teratoma at the time of operation had already been destroyed by the advancing carcinoma. This is a very broad assumption and comes dangerously near " begging the question."

I still consider it the wiser plan to make a separate group of those tumors which show typical histological characteristics of teratoma, as Chevassu and Wilms have done. This group of tumors will be found to present markedly different clinical features from the larger group of tumors, which have been almost universally designated as sarcoma by the older pathologists, but more recently have been classed as carcinoma or mixed tumors. This larger group of cases—exclusive of the teratomas proper—have a very similar clinical history, and in harmony with that of carcinoma tumors rather than sarcoma. Hence, I believe that the old idea of classing them all as sarcoma was probably an error. Like carcinoma, they have a strong tendency to involve the neighboring lymphatic glands, and again, like carcinoma, they are much less strongly influenced by the mixed toxins of erysipelas and bacillus prodigiosus than sarcoma.

Is it not possible to assume that a preëxisting teratoma may play a secondary and minor part in the etiology of malignant tumors of the testis, such as the dermoid cysts play in malignant disease of the ovary, or as chronic mastitis or benign adenomas play in the development of cancer of the breast? They simply offer a point of least resistance or a favorable soil for the development of the disease. No matter what views we may hold as to the etiology of these tumors of the testis, the wide difference of opinion as to their classification, that exists among pathologists at present, furnishes a very good reason for reverting to the old and comprehensive term " cancer," which includes all varieties of malignant tumors. This was evidently the opinion of Chevassu, for he groups all his cases as "cancer of the testicle."

In 1901 (ANNALS OF SURGERY, September, 1901) Dr. B. H. Buxton and I reported before the New York Surgical Society a very typical case of teratoma of the testicle, in which a very careful microscopical study was made by Dr. Buxton. In this report we stated:

"Wilms's paper (*Beiträge zur Pathologischen Anatomie,* Ziegler, Band xix) is undoubtedly the most complete and valuable work we have upon teratoid tumors of the testis, but we must remember that it was written entirely from the point of view of the pathologist.

The material upon which his paper is based comprises ten tumors of the testis observed by himself at the Pathological Institute of Giessen, and which he classes as "*Mischgeschwülste des Hoden,*" and fifteen others, classed as dermoid cysts, that he has collected from literature. To show the confusion that has existed up to the present time, and still exists, as to the classification of these tumors, we need only to note that the original microscopical diagnosis in the ten cases which he classes as teratoid tumors was as follows:

The first case was classed as a myxosarcoma;
The second as a cystosarcoma;
The third as a carcinoma;
The fourth, mixed tumor of the testis;
The fifth, carcinoma;
The sixth, medullary carcinoma;
The seventh, cystoma;
The eighth, cystoid disease of the testis;
The ninth, cystosarcoma of the testis;
The tenth, teratoma, with malignant degeneration.

I do not think we should adhere too literally to the view of the pathologist, that these teratoid tumors are non-malignant. In two of Wilms's ten cases the subsequent history proved them to have been malignant, and in several of the remainder the after-history was not traced."

The Prognosis of Cancer of the Testicle.—The prognosis of sarcoma of the undescended testis, as I have already stated, is exceedingly grave. Bulkley's entire series of 57 cases of sarcoma of the testis, shows only one in which the patient remained well over three years. My own series of 11 cases shows two patients living beyond three years.

The nearest approach to a cure has been my case, Dr. B., in which a very extensive tumor was removed by Dr. J. B. Murphy, who sent him to me immediately after he had recovered from the operation, for prophylactic treatment with the toxins. When he reached me there was already marked induration in the iliac fossa and abdominal wall, whether due to a recurrence or an inflammatory condition resulting from the operation, it is impossible to state. At any rate, the induration disappeared under the toxin treatment and the patient remained well for three years, and then died of a probable recurrence in the lung, but it is not entirely certain, as he had been suffering from tuberculosis of the lungs for some time before he developed the sarcoma of the testis.

Of my other cases of cancer of the undescended testis, one of the inguino-superficial type, operated upon by Dr. Howard Lilienthal, and treated by him with the mixed toxins of erysipelas and bacillus prodigiosus, under my direction for several months, is still well six years thereafter.

Until recently few statistics have been available upon which to base any very definite conclusions as to the actual prognosis of sarcoma of the testicle. The most important recent statistics are found in the papers of Kober,[1] Chevassu,[2] and Codman.[3]

Of 114 cases collected by Kober, which were treated by operation, 37 were not traced. Of the remaining 77, 41 died in from a few days to three years. Of these 41 fatal cases, 23, or 56 per cent., died within five months, of metastases. Eleven others died from seven to twelve months after operation, making 83 per cent. of the fatal cases that died within the first twelve months after operation. Two patients lived beyond three years, but died later of recurrence.

The next important statistic is that of Chevassu.

Of 100 cases collected by Chevassu, 19 were living four years after castration. As to the histological type of tumor, in these cured cases, 16 were "epithelioma seminal," a tumor characterized by Chevassu as seminoma. Only three were of the mixed type, ordinarily known as embryonal sarcoma.

A recent and important statistic is that found in a brief report of Codman, who collected 80 cases treated at the Massachusetts General Hospital within the last forty years, 63 having reports of pathological examinations of the specimens removed. Sixteen cases could not be traced. Of the 64 cases traced, 13 were living, 12 died of other causes; of these 10 had been operated upon. Thirty-nine died of the disease, 33 with, 6 without operation, giving a mortality of the disease of 61.9 per cent. Of the 56 cases operated upon, 13 were living —average time after operation 8 years; extremes 2 and 28 years. Ten died of some other trouble—average time after operation, 10 years; extremes 7 months and 26 years. Twenty-three, or 41.07 per cent. of those operated upon, survived the disease. If 8 unoperated and 12 cases operated upon when metastases were evident are excluded, we find that 52.27 per cent. were cured. From this study, Codman concludes that, "the prognosis of sarcoma of the testicle, while bad, is not,

[1] Am. Jour. of Med. Sciences, 1899, vol. 117, p. 35.

[2] Thesis of Paris, 1906; Rev. de Chir., 1910.

[3] Boston Med. and Surg. Jour., February 19, 1914, p. 267.

when operated, so universally bad as text-books would lead us to infer." These statistics going back over a long period include a number of cases in which the diagnosis was not confirmed by microscopical examination and cannot fairly be compared with Chevassu's series or the later statistics of Hinman.

My own series of cases furnishes few data as regards the prognosis of sarcoma of the testis after operation, inasmuch as the great majority of cases were referred to me after a recurrence had taken place and many in a very far advanced and hopeless stage of the disease; only 9 cases were operable when referred to me. On the other hand, the very nature of this series of cases throws further light upon two very important questions:

1. Can anything be done after primary operation to improve the prognosis?

2. Can anything be done with even a remote chance of cure after recurrence has taken place?

The most recent statistical study giving the result of operative treatment of the testicle, is the admirable paper of Hinman, assistant resident surgeon, Johns Hopkins Hospital, read before the meeting of the American Medical Association, June, 1914 (*Jour. A. M. A.*, December 5, 1914).

An analysis of the 32 cases reported is of great interest; 25 were admitted to the Johns Hopkins Hospital, 2 were not treated, and in 7 the operation was performed outside and the specimens sent to the laboratory of Dr. Jos. C. Bloodgood for diagnosis. Seven of the tumors occurred in the undescended testis, which, Hinman states, supports the accepted view that malignancy is relatively more common in men with undescended, than normally descended testes.

The age limits were twenty-four and sixty-seven years; 8 were under thirty.

As regards trauma, it is stated that in 11 cases or 33 per cent. there was a history of some antecedent injury.

The duration of the disease from the time it was first noticed until operation, varied from one month to 20 years. Hinman states that 4 cases of the series in which the patients are still alive, had a pre-operative duration of four months, two years, six years and twenty years. He concludes that the duration gives no clinical indication of the character or degree of malignancy.

He states that the pathologic material was personally examined in 22 of the cases. Parts of all of these showed a picture typical of these testicular tumors and not duplicated by any other tumor, in the presence of characteristic large round cells in a lymphoid or fibrous stroma. In 10 of the cases in addition to these typical areas of carcinoma cells there were found, either alone or in association, areas of cartilage or of cystic, glandular, myxomatous,

fibromuscular or embryonic connective tissues, which he states place them in the group of teratomas. The round cells of the simple-cell tumors were in all cases larger than lymphoid cells, and the round-cell picture in the two types of tumors was absolutely identical. In the majority of the tumors in which cartilage was found it was present in small areas and might easily be overgrown by the more active carcinoma cells, and this may have occurred in these pure-cell tumors. In 6 of the 10 cases in which no material was available for study, a previous microscopic diagnosis of alveolar or round-cell sarcoma has been made. Hinman states that in view of the fact that the previous diagnosis of the 12 pure round-cell tumors and of 3 of the mixed tumors had been some form of sarcoma, it is to be supposed that these 6 cases were either teratomas or a one-sided development of a teratoma. "These findings" he states, "only confirm those of Ewing, namely, that, clinically, all malignant tumors of the testicle are of teratomatous origin."

Hinman states that there were a number of cases with the clinical diagnosis of malignancy in which the removed testicle, on subsequent microscopic examination, proved to be the seat of syphilitic orchitis.

Metastases were clinically present at the time of the operation in four of the patients, all of whom died of carcinomatosis. Seventeen patients had retroperitoneal glandular metastases at death. In 8, death is said to have been due to general carcinomatosis and presumably lumbar metastases were present.

The ultimate result is known in 24 cases, of which 20 are dead and 4 living. Of the 18 cases in which the result is known and the specimens have been examined, 9 are pure round-cell carcinomas and 9 are teratomas. Of the former group two patients are alive, one 12, the other 13 years. None of the seven patients that are dead lived over 2 years. Of the latter group (teratomas) all are dead except one, who is now alive for only 16 months. Hinman believes that this shows the higher malignancy of the mixed type, which is in accord with Chevassu's opinion.

In the 4 cases in which the material was not available for study, one is alive 12 years; the other three died one, two and eight years, respectively, after operation.

In view of the very bad prognosis of the ordinary surgical treatment of cancer of the testicle by removal of the testis and cord, Hinman strongly advocates the radical operation proposed by Chevassu, in most cases, and gives the first complete résumé and analysis of the cases thus far operated upon by the radical method. He has collected 44 attempts at radical removal of the primary pre-aortic lymph area in treating testicular tumors. The fact that over 7 per cent. of the few cases so far reported that have been subjected to the radical method were found on subsequent examination of the specimens to have had syphilitic orchitis, has induced him to advocate doing the operation in two stages: (1) simple castration and thorough histological examination of the tumor; (2) the operation for removing the lumbar glands. The latter is a very extensive operation and is carefully described by Chevassu and Hinman. It is, however, the results of the cases thus far operated upon that chiefly concern us here. Five of the patients died of post-operative complications, three of pneumonia, two of peritonitis, giving an operative mortality of 11 per cent.

With the exception of two cases there was no clinical evidence of lumbar metastases before operation. Of the remaining 42, 20 were living: 9 over 2 years,

the longest 4 years and 10 months; the shortest one month. The average time since operation of the 20 reported alive is one year and 8 months. Sixteen or 41 per cent. have died of cancer, all within one year, except 2.

While the lumbar glands were palpable in only two cases before operation, 22 or over 50 per cent. of the cases showed cancer invasion of the lumbar nodes removed at operation, and in 11 of these the involvement was so extensive as to be inoperable. In 8 of the cases in which the lumbar glands were removed, subsequent microscopic examination showed no cancer invasion. In 3 no lumbar glands were found at operation. All of the 11 patients in whom the glandular involvement was so extensive as to render its complete removal impossible, are dead, except 2 who had been observed for only one month. Of the 14 patients with glandular involvement in which the glandular area was supposed to have been completely removed at operation, 7 are living, one died of pneumonia 7 days after operation and 6 died of a recurrence of the cancer. Of the 8 patients with clean glandular removal, but in which no involvement could be found, 5 are living and 3 died of cancer. Two of the 3 in whom no glands at all were found, are dead. Of the 6 in which no mention is made of glands, 2 are dead, one and twelve months after operation; 3 are living, 1, 12 and 48 months.

Of the 6 patients referred to, who had glandular metastases removed, one, in whom 2 of the glands removed at operation showed marked invasion, is now alive and well almost five years after removal; 3 other patients are alive with no evidence of recurrence for almost 3 years from the time the glands were removed, and 2 other patients were alive after operation, 8 and 1 months, respectively, at the time of the last report.

Among the conclusions reached by Hinman are:

Orchidectomy will cure from 15 to 20 per cent. of teratoma testis. Obviously a cure is possible only when the testicle is removed before the onset of glandular or other metastases.

"The experience of various surgeons in a total of 46 cases has demonstrated in suitable cases the feasibility and technical ease of the radical operation with a combined mortality in all cases of only 11 per cent."

At first sight, the argument in favor of the radical operation so strongly urged by Chevassu and Hinman seems cogent and sound, but after a more careful analysis, several weak points appear. Taking Hinman's own figures, we find that about 50 per cent. of the cases subjected to the radical operation showed no involvement of the glands at all, and hence, 22 patients had to undergo a very grave operation only to find that there was no occasion for it. The next and very important point is, that in 11 cases, or about 25 per cent. of the total number, the glands were found to be so extensively involved that the condition was inoperable. In other words, in 50 per cent. of the cases operated upon, no glands were present; and in 25 per cent., the condition was so far advanced as to make surgical removal impossible; thus, in 75 per cent. of the cases no benefit was offered from the operation.

We find then this very formidable operation with a mortality of 11

per cent. advised as a routine measure in all cases of cancer of the testicle, when it offers no hope of benefit in 75 per cent. of the cases. Therefore, it is clear that the only ground for justifying the operation must be the benefit that it offers in the small group of 25 per cent. of the cases, in which the glands were found at the time of the operation, and it was possible to remove them surgically. In this group we find, out of 14 cases operated upon, 6 died of recurrence, and one died from the operation, leaving seven cases still living at the time of the report.

The duration of life after operation in a few of these cases is insufficient to justify classing them as cures, only 1 was well over 3 years. Therefore, at present we can safely state that we have no data for estimating the number of actual cures. I do not believe the number of lives saved by the radical operation, sufficient to offset the mortality of the operation itself.

Another serious objection to the operation, in my mind, is, that even though no glands are found after a most careful dissection, this does not mean that they are not present, since of eight cases, of Hinman's collection, in which no involvement could be detected after a clean removal of all the glands, three died of cancer. Another most striking fact is, that of the three cases in which no glands could be found, two are now dead from a recurrence.

OPERATION: REMOVAL OF TESTIS AND CORD, FOLLOWED BY PROLONGED TOXIN TREATMENT

I believe that my own series of cases show that cancer of the testis treated by simple orchidectomy, without any appreciable risk, and followed by a thorough course of treatment with the mixed toxins of erysipelas and bacillus prodigiosus (also without risk), have a far better prognosis than those subjected to the very extensive laparotomy with removal of the lumbar glands, as advocated by Chevassu and Hinman.

In comparing my own results with other series of cases of cancer of the testicle, it is important to note that my series represents an entirely different type of cases from the others, inasmuch as in the majority of cases the disease was far advanced at the time when the patients came under my observation. In only 9 the toxins were given immediately after primary operation before recurrence had taken place, and yet in spite of this, 13 patients were well beyond a period of 3 years, and only 2 of these recovered without the use of the toxins; furthermore, both were of the teratoma type, one almost a pure tera-

toma and probably not malignant; the other a teratoma with carcinomatous degeneration.

It is further worthy of note that 2 of the cases of this series were cancer of the undescended testis. In one case the toxins were used after operation and the patient remained well over three years, when he died either of metastases or tuberculosis, probably metastases. In the other, the toxins were used as a prophylactic after operation; the patient is now well, 8 years.

Very few recoveries from sarcoma of the undescended testicle are to be found in the literature.

Dr. Robbins has sent me a more detailed report of his case mentioned in the discussion of Hinman's paper (*Jour. A. M. A.,* December 5, 1914). It is as follows:

Male, age fifty-five years, carpenter. Family history negative; no history of trauma. Patient had some enlargement of the right side of scrotum—whether due to hydrocele, or enlargement of the testis itself, it was impossible to determine for a period of twenty years. He was tapped several times during the year prior to the operation. The last time, bloody fluid was obtained, and a rapid increase in the size of the testis was noticed.

Operation (January 7, 1909).—A large tumor of the testis was removed, the lower part of which was elastic in consistence, and the upper, comparatively hard. The tumor was partly broken down at the time of the operation. Some portion of the healthy testis remained. A rapid, local recurrence followed, and on June 22, fifteen days after the primary operation, a second operation was performed, which consisted in the removal of a large portion of the scrotum on the same side, and the cord as high up as the internal ring, leaving apparently clean normal tissue. One week later (January 28) a well-marked local recurrence appeared, and grew very rapidly. Believing that there was no hope in further operative interference, the patient was put upon the mixed toxins of erysipelas and bacillus prodigiosus, the dose being carried up to the point of producing severe reactions—temperature of 102°–103°. No further growth was noticed, and the recurrent tumor slowly disappeared. The patient was discharged from the hospital on February 15, 1909, and the injections were continued for some weeks longer, twice a week. He remained in good health for four years, when he developed nephritis, which proved fatal. There was at this time no evidence of any return of his old trouble.

Hertel of Copenhagen, Denmark (*Hospitalstidente,* April 7, 1909), in a paper upon "The Treatment of Sarcomata with Coley's Fluid" reports 2 cases of inoperable recurrent sarcoma of the testis treated with the mixed toxins of erysipelas and bacillus prodigiosus. He states that the outcome is highly encouraging for the utilization of these injections in suitable cases. He will feel obliged in the future to employ Coley's fluid in all sarcoma cases which may come under his treatment, even when he feels certain of having removed all sarcomatous tissue in a radical operation.

The first case, male, twenty-nine years of age, upon whom castration had

been done at the hospital in 1904, for sarcoma of testicle. A recurrence was observed a year later in the inguinal glands, which were then extirpated. Two years later there again was an extensive recurrence in the same region and a third operation was advised, although the danger and possible uselessness of such procedure were fully appreciated. Lennander's operation was performed and, in the course of the same, infiltrated glands were seen to extend upwards along the iliac vessels, and some of these had to be left behind as they could not be reached. The expected femoral thrombosis did not occur and the wound healed within a month after operation.

In the hope of perhaps influencing the sarcomatous tissue that had been left behind, Hertel, in January, 1908, began the use of the mixed toxins in doses of from three to twenty cgr. On March 20, the patient was discharged well and at the time of the report, November, 1908, was presented before the Koege Medical Society in good condition, without a trace of recurrence. A recent letter from Dr. Hertel tells me that the patient has remained well now 10 years.

Hertel's second case was that of a man, thirty-nine years of age, in whom, likewise, the testicle had been removed for sarcoma. A few months later there was a large recurrence in the abdomen, which seemed inoperable. The toxins were begun at once with the result that the nodules became softer and more fluctuating, although the size of the abdomen did not diminish. He grew constantly weaker, developed ileus and died. Autopsy showed a single large retroperitoneal cyst. Hertel states, if this diagnosis could have been rendered during life, the cyst might have been emptied through a lumbar puncture and the remaining cyst wall could have perhaps been made to disappear through continued treatment with the toxins. There was no trace of recurrence elsewhere.

These two cases of Hertel's offer very strong evidence of the value of the toxins in recurrent sarcoma of the testis even in the presence of extensive involvement of the retroperitoneal glands.

If results like these found not only in my own series of cases, but confirmed by other observers, can be obtained by the use of the toxins it would seem to be much more rational and logical to advise a thorough course of the toxin treatment as a prophylactic immediately after operation, rather than subject all cases to the very grave operation of extensive dissection of the abdominal glands, especially if such an operation is associated with a mortality of 11 per cent.

Trauma.—My series show a definite history of antecedent trauma in 33 per cent. of the cases. This history was so clear and definite in most instances that it is quite impossible to brush it lightly aside as a mere coincidence, as most writers have done. That antecedent, local trauma is a very definite causative factor in the etiology of malignant tumors of all types and in all localities, must be regarded as a well established fact, and particularly is this true in tumors of the testicle, breast and long bones. For further proof of this theory I would refer

to my paper upon " Injury a Causative Factor in Cancer," ANNALS OF SURGERY, 1912.

Site of Recurrence.—My series of cases show that recurrence took place in the inguinal region in 6 cases; in the other testicle in 2; in the supraclavicular glands in 2, in the tongue in 1, axillary glands 1, lungs 2, retroperitoneal glands in 42.

These cases show that the statement made by some writers that recurrence is practically always found in the abdominal glands, is not strictly true.

As regards the type of cell, my cases show sarcoma in 47, teratoma in 2, carcinoma in 2, melanotic sarcoma in 1, fibrosarcoma in 1, mixed-celled sarcoma in 1, small round-celled sarcoma in 7.

The following is a brief report of patients who have remained well upwards of three years.

CASE I.—Male, forty-four years of age. In 1899, testis was removed at the New York Polyclinic Hospital by Dr. John A. Wyeth. The diagnosis of round-celled sarcoma was confirmed by microscopical examination. One year later the disease recurred in the other testis, and castration was strongly urged by the attending surgeon, but refused by the patient. He was put upon the mixed toxins of erysipelas and bacillus prodigiosus, the treatment being carried out by Dr. W. J. Robinson of Danville, Va. The tumor very quickly disappeared. Eight years later, I personally examined the patient, and found him in good health, with no trace whatever of a recurrence. He was still well, when last traced, thirteen years later.

CASE II.—E. O. T., forty-six years; operated upon February 23, 1906, for a rapidly growing tumor of three months' duration. No history of tuberculosis or specific disease. Pathological report: round-celled sarcoma of extreme malignancy. A personal examination, March 22, 1906, showed a small lump, the size of a hazel-nut, in the groin, with enlargement of the deep iliac glands. The patient was immediately put upon the mixed toxins which were continued, three times a week, for seven months, fairly good reactions being obtained. He is still in good health, at the present time, eight years later.

CASE III.—J. P. N. L., adult; operated upon at the Mayo Clinic in November, 1910, for a sarcoma of the left testicle. Diagnosis confirmed by microscopical examination. The mixed toxins were started shortly after the operation, and continued by the family physician, Dr. Embree of Gayville, S. D., under my direction, for nearly three months. The patient is in good health at present, with no sign of a recurrence, nearly four years later.

CASE IV.—W. M. H., twenty-six years, operated upon February 1, 1906, by Dr. J. E. Simmons of Omaha, Nebraska, for a rapidly growing tumor of three months' duration. Microscopical examination proved the disease to be round-celled sarcoma. The toxins were started by me, and later continued by the family physician for about six months. The patient is at present well, with no sign of a recurrence, eight years later.

CASE V.—S., age forty-three years, operated upon in the summer of 1910,

for a rapidly growing tumor of the left testicle, the clinical history and physical signs of which pointed to sarcoma. This diagnosis was confirmed by a number of prominent surgeons. No evidence of tuberculosis; Wassermann negative. About two months later a recurrence took place in the groin, and a second, apparently incomplete operation was performed in the latter part of August, 1910. One month later, after recovering from the operation, the toxin treatment was started by Dr. Percy Shields of Cincinnati, Ohio, and continued until July, 1911. The largest dose given was ten minims. The patient is in good health at present, four years later.

CASE VI.—The following history was given to me by Dr. Wm. Mabon, superintendent of the Manhattan State Hospital: In 1890, patient was operated upon for a tumor of the testicle, which, on microscopical examination, was pronounced sarcoma. Five years later a growth appeared upon the tongue, and increased in size. Extirpation of the tongue was advised by Dr. Mabon, but the patient's family objected so strongly to such a radical operation, that Dr. Mabon decided to try the mixed toxins before excision. Previous to this a section of the tumor was removed by exploratory operation, and submitted to Dr. Wm. H. Welch of Johns Hopkins, who pronounced the trouble round-celled sarcoma. The patient proved very susceptible to the toxins, severe reactions following relatively small doses. The tumor entirely disappeared under the treatment and, in a letter received from Dr. Mabon, under date of March 5, 1910, he states that he has just heard from the patient's wife, who reports him to be in good health, fifteen years after the treatment was started.

CASE VII.—J. D., aged thirty-two years. Referred to the General Memorial Hospital in December, 1908, for an irreducible scrotal hernia. In addition to a large hernia, we found a large, solid tumor the size of a fist, extending up to, but entirely outside of, the hernial sac. Operation: testis removed, which on microscopical examination by Dr. Ewing, was pronounced carcinoma. The patient returned home three weeks later. I examined him personally, on January 31, 1912, at which time he was in good health with no evidence of a return.

CASE VIII.—S. C., forty-nine years, operated upon, July, 1906, by Dr. Schoonover, of Yonkers, N. Y., who pronounced the disease round-celled sarcoma. Two months later a recurrence took place in the abdomen, followed by enormous swelling of the leg and thigh. The toxins were then begun under my direction, and, almost immediately after, the swelling began to decrease in size. The treatment was continued from December, 1906, to February, 1908, at which time the swelling had almost entirely disappeared. The patient received nearly 200 injections of the toxins. The disease finally recurred, causing death in July, 1909.

CASE IX.—P. G., aged fifty-one years, was first seen in consultation by Dr. Howard Lilienthal, in December, 1908. Operation December, 1908, by Dr. Lilienthal, who found the testicle, about the size of a closed fist, occupying a position in the left groin, directly over the aponeurosis of the external oblique, in other words, an inguino-superficial type of undescended testis. Microscopical examination made by Drs. Mandelbaum, Welch, and Ewing, who pronounced the disease round-celled sarcoma. The tumor was removed to a level with the external ring. Two days later the toxins were begun and carried out by

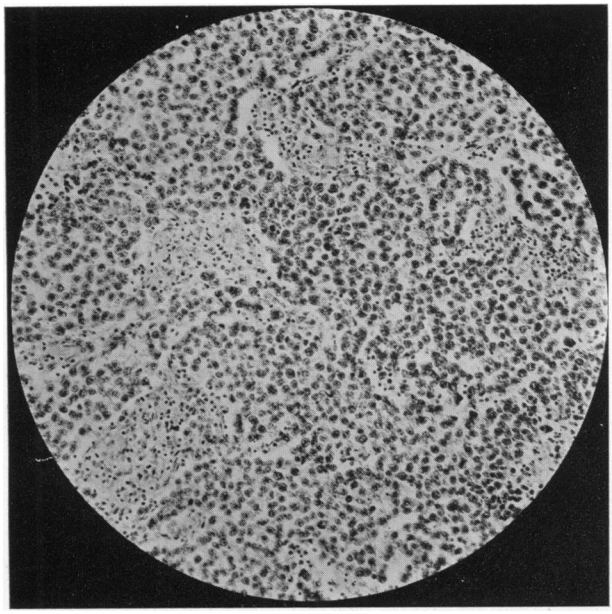

FIG. 1.—Case I. Embryonal carcinoma of testis.

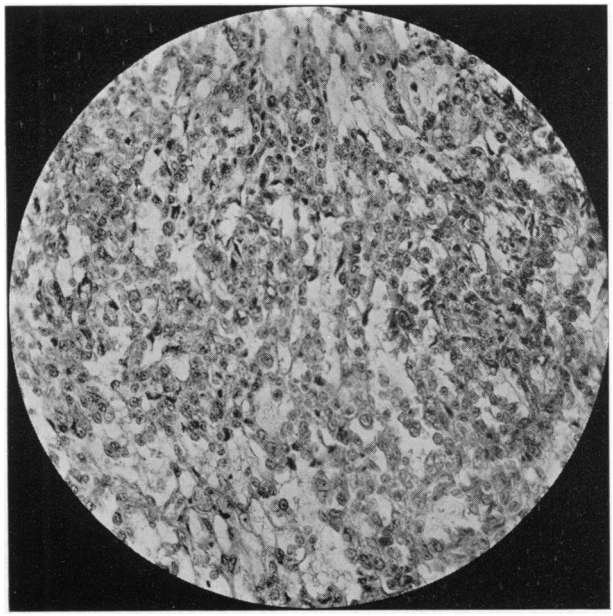

FIG. 2.—Recurrent sarcoma of testis. This section from supraclavicular recurrence.

Dr. Lilienthal under my direction. The patient is now in good health, December, 1914, or six years thereafter.

CASE X.—Dr. D. E. B., aged thirty-seven years. Family history: no syphilis; tuberculosis of lung for past ten years. Two weeks before the first operation, noticed pain in the left hip, together with slight enlargement, and tenderness in the right iliac region, and over the bladder. He consulted Dr. John B. Murphy of Chicago, ten days later, who immediately operated and found a tumor the size of a closed fist. As soon as he recovered, he was sent to me for the toxin treatment (a full history of this case is given below in the list of Undescended Testis cases).

CASE XI.—G. J., aged twenty-seven years; no history of trauma. In April, 1900, first noticed enlargement of the testicle. Operation December 10, 1900, at which time I removed a tumor the size of an orange, which proved to be a typical teratoma of the testicle. A microscopical section had already been reported upon. Patient received the toxin treatment, and when last heard from, three years later, was in good health.

The following is a brief record of my personal cases of cancer of the undescended testicle.

CASE I.—Dr. D. E. B., thirty-seven years; referred to me by Dr. J. B. Murphy of Chicago, on July 8, 1908. The left testis had never been in evidence. No specific history. The patient has suffered from tuberculosis of the lung for ten years. The first symptom was dull pain in the region of the left hip; very severe the second night; it then grew less and disappeared. Shortly afterward he noticed a slight enlargement of the left inguinal and iliac region, extending toward the bladder; slight tenderness on pressure. Ten days after the first symptom, he consulted Dr. John B. Murphy, who operated immediately, and found a tumor the size of a closed fist, completely involving an undescended testis. Microscopical examination proved the tumor to be round-celled sarcoma. As soon as the wound had healed, Dr. Murphy referred the patient to me for the toxin treatment as a prophylactic against recurrence. The entire tumor was sent on and examined by Dr. Jas. Ewing, who confirmed the diagnosis made. The patient was put upon the mixed toxins and proved to be very susceptible, a reaction temperature of 106° following a dose of 3 minims. In December, 1908, the old tubercular trouble became active again and the patient went to Wyoming. The toxins were still continued and gradually his general health became greatly improved; his weight was 170 pounds. He remained in good health without sign of recurrence until the latter part of 1911, when symptoms of abdominal recurrence appeared. He died early in March, 1912.

I think it is fair to assume that the toxins used after operation

played some part in preventing a return of the disease until three years later.

CASE II.—S. B., forty-two years of age; referred to me November 20, 1906; had always had a right undescended testis; no history of trauma. In the spring of 1906 he noticed enlargement of the undescended testis region. Operation was done at the Presbyterian Hospital in June, and the tumor proved to be a sarcoma. A few weeks later numerous tumors appeared in the abdomen, and a second operation was performed in October, by Dr. Wilken of the City Hospital. A vertical incision was made just outside the right rectus, and a tumor, the size of a cocoanut removed. Temporary improvement followed, but a recurrence took place shortly in the shape of a large number of tumors involving the retroperitoneal and mesenteric glands. Physical examination by myself on November 20, showed the patient markedly emaciated and anæmic, and in a desperate condition. The toxins were given for a short time, without apparent effect. Death occurred a few months later.

CASE III.—*Spindle-celled sarcoma primary in the undescended testis, involving mesentery, omentum and lower half of kidney.* S. C., forty-four years; farmer; case of Dr. Maskel Lee, of Wapella, Ill.; no history of trauma. This is another example of abdominal ectopia. The first symptom in this case was pain in the left chest, passing down the left side to the groin. There was slight loss of weight. The first examination by Dr. Lee showed a large tumor, ½ × 7 inches, extending from the left iliac crest to 1½ inches to the right of the umbilicus; firmly fixed; skin not adherent. Temperature 96°, pulse 80; urine highly albuminous; no blood count taken. The patient was sent to a hospital and kept under observation for ten days. The diagnosis of inoperable tumor, probably sarcoma, was made. The patient was then taken to the Rochester Clinic and an exploratory operation was done by Dr. Wm. J. Mayo on March 11, 1913. The abdomen was opened 2 inches to the left of the umbilicus and an immovable tumor was found, starting from an undescended testicle, involving the mesentery, omentum and lower half of left kidney. Microscopical examination proved the tumor a spindle-celled sarcoma. The disease was entirely inoperable and Dr. Mayo advised the mixed toxins. The treatment was begun by Dr. Lee on April 9, under my direction, the doses ranging from ½ to 6 minims, followed by well-marked reactions. After the fifteenth dose, Dr. Lee states:

"There is evidently marked softening with decrease in size and the pain ceased after the sixth injection." After the thirty-

second injection, Dr. Lee writes: "The patient's condition is improved in every way; the tumor has diminished in size, softened and loosened; he sleeps and eats well and has gained some weight."

After the sixtieth injection, Dr. Lee writes:

"It is now a little over six months since the treatment was begun. The tumor is slowly but surely disappearing. It has decreased in size fully one-third. No pain; gain in weight."

The improvement continued until the early part of November, when he began to have obscure pains in various parts of the body and rapidly declined until he died on December 4, evidently of general metastases.

CASE IV.—I. N. R., thirty-five years. This is a further example of abdominal ectopia. No testicle ever noticed on right side. Two years ago, in 1903, he began to have pain in the right inguinal region; he consulted Dr. J. B. Waterman of New York, who thought it might be due to a hernia and ordered a truss. The truss only aggravated the pain and the patient consulted a Chicago surgeon, who made the diagnosis of appendicitis, for which operation was performed on July 24, 1904. An incision was made in the right iliac region and an enlarged testis was found which extended so far toward the median line, that a second incision through the right rectus was made. On microscopical examination the tumor proved to be a teratoma with sarcomatous degeneration. There were no adhesions and the sarcoma part was all within the capsule of the tumor. The patient was referred to me for the toxin treatment, which was begun in September and continued in small doses up to February, 1905, never sufficient to cause any severe reactions. Physical examination January 28, 1905, showed a well-marked induration in the right iliac fossa and a thickening of the scar in the right rectus muscle; the abdomen itself was also somewhat enlarged; his general health was apparently not yet affected. Death occurred within a year.

CASE V.—*Sarcoma of the undescended testis; inguinal ectopia; trauma in early childhood.* P. G., fifty-one years. While playing ball during boyhood, he was struck in the left testicle, which was followed by considerable swelling and inflammation. At this time the testicle retracted into the inguinal region, where it has remained ever since. In 1905 or 1906 he began to have periods of discomfort and pain in the left groin; in the summer of 1907 he noticed enlargement of the testicle which then rapidly increased in size. Operation December 3, 1908, by Dr. Lilienthal, who found the testicle about the size of a closed fist, occupy-

ing a position in the left groin, resting upon the aponeurosis of the external oblique, instead of underneath it, pointing to an inguino-superficial type of maldescent. No communication was found with the abdominal cavity at the operation. The testicle was removed and found to be markedly broken down, resembling very much the caseation of tuberculosis. Microscopical examination made by Drs. Mandlebaum, Welch and Ewing proved it to be *round-celled sarcoma.* After recovery from the operation, I saw the case in consultation with Dr. Lilienthal and advised the toxins as a prophylactic measure. The treatment was given for several months by Dr. Lilienthal and the patient is in good health at present, nearly six years later.

This, I believe, is the only case of sarcoma of the undescended testis on record, well over three years.

CASE VI.—S. W., twenty-nine years. Patient had worn a truss for a year, five years ago; this caused so much pain, that it was left off. He consulted me in August, 1908, and stated that three years ago he suffered from gonorrhœa and prostatitis; the left testicle became swollen shortly after this. Eight months ago he had a second attack of gonorrhœa with inflammation of right and left testicle. He complained of a vague feeling of discomfort and pain six months ago, the pain being localized chiefly in the left loin. One month ago a tumor was first noticed in the pelvic region. Operation by Dr. Charles L. Gibson of St. Luke's Hospital in July, 1913, who found a tumor apparently involving an undescended testis, superficially on the right side, deeply on the left, extending across the whole abdomen and bladder, involving the bladder wall. Microscopical examination showed the tumor to be *carcinoma.* It was the size of two fists and pronounced inoperable.

CASE VII.—A. H., fifty-five years (abdominal ectopia). Referred to me by Dr. Thos. J. Harris, of New York City, on July 9, 1913. Operation had been performed in the early part of 1911, by a New York surgeon, for what was believed to be a hernia. At the operation, however, a large tumor was discovered, evidently malignant, occupying the iliac fossa and lower abdominal cavity. It was regarded as too extensive for complete removal. A portion was excised for microscopical examination, and proved to be sarcoma. An attempt later was made by another surgeon to extirpate the growth, but it was found impossible to remove it entirely. The patient showed temporary improvement for three months, and then began to get worse; pain and hæmaturia recurred. In July, 1913, he was seen in consultation by myself, and the toxins were advised in the hope of bringing temporary

relief. They were given for six weeks in small doses, with little apparent effect. The patient grew rapidly worse, and died a few weeks later.

CASE VIII.—D. T., thirty-one years. Family history negative. Left testis undescended at birth. The patient had noticed enlargement of the left testicle during the year preceding operation, which latter was performed by a prominent surgeon of New York in June, 1909, for a left inguinal hernia and left undescended testis. An attempt was made to bring the latter into the scrotum, but it subsequently retracted into the inguinal region. No other history of injury. In 1910 enlargement of the testicle became apparent and he consulted a surgeon, but was told it was of no significance. There was no pain at any time, although the swelling increased rapidly in size, and the patient lost considerable weight. An operation was performed by Dr. Friend of the Michael Reese Hospital of Chicago in June, 1911. The microscopical examination was made by Dr. W. J. Jobline, from whose report I quote:

> From the presence of cartilage cells and two different definite types of tumor, it is very probable that the original growth was a teratoma undergoing malignant change. It may be called a malignant embryoma.

The patient consulted me in July, 1911, but there was already marked evidence of recurrence with extreme emaciation and general metastases, so that I believed the case too far advanced for the use of the toxins. Death occurred shortly afterward.

CASE IX.—J. R. S., thirty-three years. Family history good. Double undescended testis since childhood. First operation in June, 1905, by Dr. Wyeth, at the New York Polyclinic; both testes were removed for sarcoma. The right was the size of a goose egg, the left $2 \times 3\frac{1}{2}$ inches in diameter. Microscopical examination was made by Dr. Jeffries of the Polyclinic Laboratory. The patient remained well until 1907 when he had an attack of abdominal colic. Similar attacks occurred in 1908–1909; pain and indigestion followed and a general falling off in health. In 1911, he had three severe attacks of colic, in 1912, four. He had very severe pain in the abdomen, which was followed by moderate temperature, 99° to 100°, and great prostration. A mass, the size of a fist, appeared in the retroperitoneal region; this increased in size, and the patient was brought to me by his brother, a surgeon of the South, in May, 1912. Physical examination at this time showed the patient considerably emaciated; a large, apparently inoperable tumor could be palpated in the retroperitoneal region. I started the toxins, but gave a hopeless

prognosis, believing that nothing more than slight temporary retardation could be expected from the treatment. The latter was carried out by his brother who, under date of June 4, 1912, stated that the patient had gained 8 pounds in weight since the treatment was begun, that his color had improved and appetite was splendid and his strength sufficient to enable him to resume his business; there was no perceptible change in the size of the tumor. September 21, 1912, Dr. S. writes "the patient has gained 19 pounds in weight and his general health is splendid. There is a decided decrease in the size of the inguinal glands; the tumor has diminished in size to some extent and feels softer.

The improvement, as I had predicted, proved temporary only. In the early part of 1913, the patient began to get worse and death occurred on January 27, 1913.

CASE X.—B. H., twenty-two years. Possible trauma from previous operation in 1907, done for right undescended testicle and hernia, at another hospital. Testis brought into scrotum; not enlarged at that time. The patient first noticed enlargement in August, 1908. Operation was immediately performed and the testis found to be sarcomatous. The disease quickly recurred and a third operation was performed in October, 1909. The large mass of glands removed from the groin and iliac region also proved to be sarcoma.

CASE XI.—H. W. B., thirty years, was referred to me in December, 1906; the left testicle had never descended; patient never wore a truss. In October, 1903, he began to have pain and swelling in the undescended testis. In March, 1904, the tumor, which had then reached the size of a goose egg, was removed by Dr. J. K. Warren of Worcester; the patient at the time had already lost 20 pounds in weight. About 1½ years later a recurrent tumor, the size of a hen's egg, was noticed in the left groin. The inguinal and iliac glands were also involved. The patient was then referred to me for the toxin treatments, which were used for six weeks in conjunction with the X-ray, without improvement. The patient died a few months later.

CASE XII.—Case of Dr. Geo. H. Walter, Orangeburg, S. C. (abdominal ectopia). Although this case did not come under my personal observation, I was consulted by Dr. Walter in regard to carrying out the treatment. The patient, an adult, had never noticed or felt the left testicle. He had observed a tumor in the left iliac fossa for a number of weeks, causing him continuous pain in the legs and back. The first operation was performed by Dr. A. E. Baker, of Charleston, S. C. A tumor, the size of a cocoanut, partially broken down, was removed. Three weeks

later, a second operation was performed by Dr. Walter, who found a large mass in the left side, just below the umbilicus, with cancerous involvement of the glands of the intestine. I advised the use of the toxins in this case, but in a letter dated August 19, 1913, Dr. Walter stated: "The case had too far advanced when the toxins arrived, the patient died three days later."

This case, I believe, is perhaps the most malignant on record. Dr. Walter stated: "The growth developed with extreme rapidity; in five weeks after the removal of the testicle, the mass which appeared in the left side of the abdomen, opposite the umbilicus, had spread until it involved stomach and pancreas, down to within an inch of the left hip."

CASE XIII.—Since this paper was written, Dr. W. W. Grant of Denver, Colorado, has sent me the history of a very remarkable case of abdominal ectopic testicle. The case had been treated with the toxins for nearly a year, under my direction. The chief point of interest is the fact that when the toxins were begun there was swelling of the legs, and a large inoperable tumor in the abdominal cavity, which became very much smaller under continued treatment. It again increased rapidly in size during a short period of rest from treatment, but as soon as the toxins were renewed it again showed diminution in size, with disappearance of the swelling in the legs.

January 30, 1915, an abdominal incision was made, and the entire tumor was removed without great difficulty. The testicle was plainly observed in the centre of the tumor. Pathological report made by Dr. R. C. Whitman of Denver (a very competent pathologist) stated that it was a typical large, round-celled sarcoma; that is, certain portions showed a typical sarcomatous structure, while others had some appearance of the usual carcinoma,—again emphasizing the difficulty of classifying these tumors. He was again put upon the toxin treatment after operation. (This case will be reported in full by Dr. Grant.)

Note.—A full report of my results in the treatment of inoperable sarcoma in general by the mixed toxins of erysipelas and bacillus prodigiosus, including 124 cases successfully treated by other surgeons, may be found in the Transactions of the Third International Cancer Research Conference, Brussels, 1913.

SARCOMA OF TESTIS.

No.	Age.	Date.	Side.	Antecedent trauma.	Duration.	Testes normal or ectopic.	Type of tumor.	Treatment.	Result.	Final Remarks.
1	26	1906	R.	Yes. Bruise; swelling at once; subsided; returned 3–4 weeks.	Noticed 3 months before operation.	Scrotal.	Sarcoma.	Removal Jan., 1909; mixed toxins (Coley) after operation.	Well 1914, 8 years later.	
2	34	1909	L.	No.	3 months before operation.	Scrotal.	Sarcoma.	Removal Jan., 1909.	Recurred in retroperitoneal region in 6 months.	Death Nov. 30, 1909; total duration of life, 1 year.
3	21	1913	R.	No.	1 month before operation.	Scrotal.	Sarcoma.	Removal Dec. 12, 1913, by Dr. Homer Gage.	Jan., 1913, internal metastasis; rapid decline; toxins for 2 weeks; small doses, but condition so bad, given up.	Died July, 1913; total duration of life, 8 months.
4	25	1912	L.	Yes. Squeezing; injury soon after.	1 year.	Scrotal.	Fibrosarcoma.	Removed in 1910 by Dr. Geo. Ben Johnston.	Recurred in abdomen 2 years later; large abdominal tumor; cachexia, April 10, 1912.	
5	32	1908	L.	No.	?	Scrotal, associated with large hernia not known until hernia operation.	Carcinoma.	Operation, Dec., 1908, W. B. Coley.	In good health Jan. 3, 1912; personal examination.	
6	42	1907	R.	No.	3 months.	Scrotal.	Sarcoma.	Operation Nov. 22, 1907, Dr. Porter, of Boston.	Toxins begun Dec. 10, 1907.	?
7	37	1909	R.	No.	? 5 weeks.	Scrotal.	Sarcoma.	Operation Oct., 1909, by Dr. H. H. Young.	Recurrence in abdomen, 4 months.	Toxins after; large recurrence; little effect; died.
8	42	1901	R.	Yes. 8 months; strain.	8 months.	Scrotal.	Sarcoma; clinical diagnosis.			
9	42	1908	R.	Yes. Horseback at once.	10 months.	Scrotal.	Clinical diagnosis with inoperable metastasis; testes typically sarcomatous.	Case hopelessly inoperable when seen.	No treatment.	Died few weeks later.

10	38	1907	L.	No.	13 months.	Scrotal, size of fist.	Sarcoma.	Operation by Dr. Syms, of Chicago.	2 months later recurred in abdomen.	Oct. 5, 1907, mass size of 2 fists in hypochondriac region.
11	Ad.	1892	R.	No.	?	Scrotal.	Sarcoma.	Operation: removal of testis.	Recurred in tongue 5 years later; large tumor; excision of tongue advised by Dr. Wm. Mabon.	Mixed toxins (Coley) given; severe reactions. Entire disappearance; well 15 yrs.; microscopic examination by Dr. Wm. H. Welch.
12	47	1906	R.	No.	3 years.	Scrotal.	Sarcoma.	Operation, 1906; removal of testis.	July, 1906 recurrence; right groin and iliac fossa with infiltration of all neighboring tissues; mixed toxins; marked temporary improvement.	Died.
13	48	1910	L.	No.	Few months.	Scrotal.	Sarcoma.	Operation Sept., 1909.	Recurrence in abdomen few weeks; retroperitoneal glands in six months; treated with mixed toxins; tumor apparently disappeared.	Lost sight of; probable recurrence.
14	55	1902	R.	No.	2 years; painless swelling.	Scrotal.	Round-celled sarcoma.	Operation July 24, 1902.	Recurred in 2 months; local and in groin; second operation.	Rapid recurrence; toxins; slight temporary improvement.
15	46	1906	L.	No.	4 months.	Scrotal.	Round-celled sarcoma.	Operation Feb. 23, 1906.	1 month later apparent recurrence in groin and iliac gland.	Put on mixed toxins; swellings disappeared; patient well May, 1914, 8 years.
16	?	1912	R.	No.	4 months.	Scrotal.	Sarcoma (microscopic examination) Mayo's.	Removal, Feb. 6, 1912.	Toxins after operation under my direction.	Well Dec., 1914, nearly 3 years.
17	37	1908	R.	No.	4 months.	Scrotal.	Sarcoma (microscopic examination).	Operation April, 1907, by Dr. E. Eliot; recurred in 10 months, in abdomen; very extensive, with marked emaciation.	Death shortly after.	

SARCOMA OF TESTIS.

No.	Age.	Date.	Side.	Antecedent trauma.	Duration.	Testes normal or ectopic.	Type of tumor.	Treatment.	Result.	Final Remarks.
18	46	1904	R.	Yes. Injury to right testis; fall on fence rail in childhood.	Slow increase in size 7 years; 4 years tapped and bloody fluid drained off.	Scrotal.	Sarcoma.	Operation, Nov., 1903, by Dr. Lister, of Chillicothe, Ohio.	Recurrence in abdomen 2 months after.	Death within a year.
19	32	1900	R.	No.	5 months; painless lump.	Scrotal.	Sarcoma.	Operation, Nov. 15, 1899, by Dr. B. L. Bangs.	Recurrence in abdomen in 6 weeks; very great pain.	Death in few months.
20	29	1897	L.	Yes. Fall from bicycle Aug., 1896; injured left testis; tumor 2 to 3 weeks after injury.	3 months.	Scrotal.	Sarcoma, melanotic.	First operation by Dr. Millbrook of Albany; 3 operations for recurrence in 9 months. Fourth operation by Dr. Coley September, 1897.	Rapid recurrence; toxins 3 to 4 weeks; no effect.	Death in 3 months.
21	32	1912	L.	Yes. Fell on fence 18 years ago; swelling, which disappeared.	3 months; no pain or tenderness.	Scrotal.	Sarcoma, small round-celled.	Operation, Oct. 7, 1912, by Dr. Kimball.	Toxins after operation.	Well July, 1914.
22	26	1908	R.	No.	6 to 7 months; painless enlargement.	Scrotal.	Sarcoma.	D. W. Wood, Nov., 1907.	Recurrence in abdomen 5 months.	Death.
23	42	1904	R.	Yes. Injury to left testis getting out of bath tub, April, 1903. Swelling noticed 3 months later.	4 months.	Scrotal.	Teratoma	First operation, by Dr. Chetwood, Oct. 8, 1903; recurred Jan. 1, 1904. Second operation Jan. 28, 1904, by Dr. Coley.	Toxins for 2 months; little effect.	Died Oct., 1904.
24	28	1899	R.	Yes. Fall from bicycle; injured right testis.	1 year.	Scrotal.	Sarcoma, microscopic examination.	Operation, Dec., 1898, by Sir Alfred Fripp.	Recurrence in abdomen 3 months later.	Mixed toxins 6 months; slight but temporary improvement; death in 1 year.

25	28	1911	L.	Yes. Struck with baseball; severe pain 4 days; tumor 8 weeks.	5 months.	Scrotal.	Sarcoma. Mayo's laboratory.	Operation, Dec. 2, 1910, Mayo's clinic.	Toxins after operation for 1 year.	In good health 1 year later.
26	32	1910	L.	No.	6 months.	Scrotal.	Sarcoma.	Operation, July, 1910.	Symptoms of abdominal recurrence 2 to 3 weeks after operation.	Sept., 1910, very large abdominal tumor; size of child's head; toxins given; little effect; died Oct. 10, 1910.
27	49	1907	L.	Yes. Fell astride board 14 years before; injured left testicle.	2 years.	Scrotal.	Sarcoma.	Operation, July, 1906, by Dr. Schoonover.	Recurrence in abdomen and iliac fossa in 2 months; enormous swelling of leg and thigh; toxins given.	Almost complete disappearance of tumor and swelling; toxins given from Dec., 1906 to March, 1908, when tumor had apparently disappeared; recurrence and death July, 1909.
28	33	1895	L.	No.	2 months.	Scrotal.	Sarcoma.	Operation, Mar., 1893, by Dr. A. T. Cabot.	Recurred in abdomen 2 years later.	Toxins, 2 weeks, no effect; death shortly after.
29	28	1906	L.	Yes. Injured testis riding 6 years before.	3 months.	Scrotal.	Sarcoma.	Operation, May, 1906, by Dr. Torek.	Recurrence local; 2 months; second operation.	Metastasis supraclavicular and abdominal glands; 2 doses of toxins ♏½; no reaction; died 3 days later, probably embolism.
30	Ad.	1906	R.	?	?	Scrotal.	Sarcoma.	Operation, Oct., 1904, by Dr. Chas. Stewart.	Recurrence in abdomen 1 year later.	Jan., 1906, toxins ♏ 1 to 15 caused cessation of pain & growth checked; death.
31	31	1904	R.	Yes. Kicked in right testis; enlargement noticed 2 years later.	5½ years.	Scrotal.	Sarcoma.	Operation, Nov., 1906; metastasis in abdomen before testis removed.	Rapid loss in flesh and strength.	Died shortly after.
32	22	1911	L.	No. Gonorrhœa 6 months before.	2 months.	Scrotal.	Sarcoma, mixed-celled.	Exploratory laparotomy, July, 1911; removal of some retroperitoneal glands by Dr. A. A. Berg.	Aug. 29, 1911, left testis size of 2 fists; large tumor in abdomen.	Death.

SARCOMA OF TESTIS.

No.	Age.	Date.	Side.	Antecedent trauma.	Duration.	Testes normal or ectopic.	Type of tumor.	Treatment.	Result.	Final Remarks.
33	22	1897	L.	Yes. Fell from bicycle and injured left testicle; enlargement soon after.	Few months.	Scrotal.	Sarcoma.	Operation, Aug., 1896, Lenhardt.	Local recurrence 6 months. Second operation, June, 1897.	Abdominal recurrence soon; death Oct., 1897.
34	28	1901	?	No.	2 years; painless enlargement.	Scrotal.	Sarcoma.	First operation Dec., 1899, by Dr. DeGomo; recurrence 9 months in glands, in groin, and in abdomen.	Rapid decline.	Death.
35	38	1900	L.	No.	4 years.	Scrotal.	Sarcoma.	Operation, July, 1899; recurrence in abdomen.	1 year later; severe lumbar pain.	Swelling in left leg; toxins marked; improvement temporary.
36	32	1902	L.	No.	22 years; increase in size only 8 months	Scrotal.	Sarcoma.	Operation, April 2, 1902, by Dr. Coley.	?	
37	27	1900	R.	No.	9 months.	Scrotal.	Teratoma.	Operation, Dec. 12, 1900, by Dr. Coley.	Patient in good health 3 years later.	
38	?	1898	R.	Yes. Kicked in right testis by horse 2 years ago; small tumor. Second injury 4 mos. ago.	4 months.	Scrotal.	Sarcoma, round-celled.	Operation, Aug. 11, 1898.	Recurred in abdomen.	Death in 1 year.
39	35	1910	R.	No.	1 year.	Scrotal.	Sarcoma, round-celled.	Operation, May 3, 1910.	Recurred in abdomen; toxins for several months.	Death in 1 year after operation.
40	30	1906	R.	Yes. 15 years ago fell and injured right testis; 10 yrs. ago second injury.	1 year.	Scrotal.	Sarcoma.	Operation, Aug., 1906, by Dr. Deaver.	Recurred in abdomen in 6 months.	Death.
41	22	1909	R.	Yes.	6 months.	Scrotal.	Sarcoma.	No operation; hopeless when first seen.	Recurred in retroperitoneal glands.	Died a few months later; duration of life less than 1 year.
42	24	1904	R.	Yes. Blow Dec., 1901; swelling at once.	9 months.	Scrotal.	Sarcoma.	Operation, Aug., 1902.	Recurred 6 months axillary glands, ribs and lung.	Died July 25, 1903.

43	35	1914	?	No.	6 months.	Scrotal.	Sarcoma.	Operation, 1910; by Dr. Johnston, of Richmond.	Recurred 2½ years later in abdomen and supraclavicular glands.	May, 1914, inoperable; toxins tried; marked improvement.
44	32	1906	?	No.	3 years, then sudden increase in size.	Scrotal size of grape-fruit.	Sarcoma.	Operation, Jan., 1906.		
45	23	1907	R.	No. First noticed March, 1906.	2 months.	Scrotal.	Sarcoma.	Operation, June, 1906, by Dr. J. Stanley Brown.	Recurred in 8 months in retroperitoneal glands; toxins short while; no effect.	Death 11 months later, March, 1908; total duration of life, 2 years.
46	19	1896	L.	No.	1 year.	Scrotal.	Sarcoma.	Operation, Jan., 1896, by Dr. Chas. McBurney.	Large mass in iliac fossa at time of removal of testis.	Grew rapidly worse; death 2 months later.
47	Ad.	1910	L.	?	?	Scrotal.	Sarcoma.	Operation, Nov. 5, 1910 (Mayo's clinic).	Toxins begun under my direction; Dec., 1910, as prophylactic.	Patient in good health over 3 years.
48	45	1913	L.	No	Noticed first early 1910; 6 months before operation.	Scrotal.	Sarcoma, small round-celled.	Operation, Jan., 1911, by Dr. Williams.	Recurrence in 1912, in abdomen; toxins begun Sept., 1912; small doses ½ to ½ minim.	Third operation Feb. 31, 1913, abdominal operation; found large inoperable retroperitoneal tumors; not traced.
49	48	1908	L.	Yes. Horseback injury July, 1907; swelling at once.	No operation; loss, 50 lbs. weight 1 year later.	Scrotal.	Sarcoma.	No operation.	Had large inoperable metastasis in abdomen when first consulted surgeon; no glands in groin.	Toxins short time little effect; death 1½ years from first symptoms.
50	28	1910	L.	No.	July, 1910, first noticed; in 3 months size of fist.	Scrotal.	Sarcoma.	Operation, Sept. 23, 1910, by Dr. Donovan, Lewiston, Md.	Dec., 1910, recurrence in groin and retroperitoneal glands.	Mixed toxins begun Dec. 16, 1910, Dr. Coley. Marked improvement; May 1, 1911; still improving.
51	28	1914	L.	No.	Tumor 2 months before operation; no pain.	Scrotal.	Mixed-celled sarcoma.	First operation, Dec., 1912.	Well 2 years, then recurs in supraclavicular glands and lung; no involvement of abdominal glands.	Removal of glands by operation; fulguration; mixed toxins; still under treatment.
52	52	1914	R.	No.	Noticed 1 month before operation.	Scrotal.	Round-celled sarcoma.	Operation, Feb., 1914.	Abdominal recurrence 3 months later; very large abdominal tumors, Nov., 1914.	Mixed toxins Nov., 1914, 2 months marked improvement; temporary metastasis in lung.

No.	Age.	Date.	Side.	Antecedent trauma.	Duration.	Testes normal or ectopic.	Type of tumor.	Treatment.	Result.	Final Remarks.
53	37	1908	L.	No. Tuberculosis left lung 10 years.	Operation, 10 days after first symptoms (pain).	Abdominal ectopia.	Round-celled sarcoma.	Operation, June 11, 1908, by Dr. John B. Murphy; size of fist.	Toxins begun July 8, 1908, by Dr. Coley; continued at home.	Well over 3 years, then died of recurrence; duration of life, 3½ years.
54	42	1906	R.	No.	Operation 2 months after first noted, June, 1906.	Abdominal. ?	?	Presbyterian hospital, N. Y.	Few weeks later multiple recurrence in abdomen; Nov., 1906, markedly emaciated and cachectic.	Death few weeks later; duration of disease 9 months.
55	30	1903	R.	No. (No truss.)	Operation 6 months after first symptoms.	Inguinal canal.	?	Operation, Mar., 1904, by Dr. J. K. Warren, Worcester.	Recurrence in groin 1½ years later; also in iliac glands.	Toxins 6 weeks and X-rays; no improvement; death Feb., 1907.
56	22	1908	R.	Yes. Possible trauma operation undescended testis and hernia 1 year before.	First noticed Aug., 1908; operation at once.	Inguinal.	Operation, 1908.	Recurred in few weeks in groin and iliac fossa.	Third operation.	Death in less than a year.
57	33	1912	D.	No.	Operation, June, 1905.	Abdominal; double.	Round-celled sarcoma.	Both testes removed by Dr. Wyeth, June, 1905.	Well 2 years, then attack of abdominal colic; recurrence.	Toxins begun May, 1912. Marked improvement continued 6 months. Died January 27, 1913.
58	31	1911	L.	Yes. Operation for undescended testis and hernia year before.	Tumor 2 to 3 months before operation.	Inguinal.	Teratoma type.	Operation, June, 1911, Dr. Friend (Chicago).	July, 1911, 1 month later; abdominal recurrence; extreme emaciation.	Death few weeks later. Duration of disease less than 6 months.
59	55	1913	R.	No trauma.	Inoperable when discovered.	Abdominal.	Sarcoma.	Exploratory laparotomy, Feb., 1911.	Second operation; partial removal; hæmaturia.	Rapid growth; toxins, July, 1913, 6 weeks; no effect; death few weeks later.
60	29	1908	L.	Had worn truss 5 years ago; gonorrhœa 8 months before.	Tumor noticed 1 month before operation.	Inguinal.	Carcinoma.	Exploratory operation July, 1908, by Dr. C. L. Gibson.	Tumor found inoperable; bladder involved.	Death shortly after.

61	51	1908	L.	Injury in childhood.	Tumor 1 year before operation.	Inguinal; size of closed fist.	Sarcoma, round-celled.	Operation, Dec. 3, 1908, by Dr. Lilienthal.	Toxins, 3 to 4 months as prophylactic.	Patient well July, 1914, 6 years later.
62	35	1903	R.	No injury.	Supposed to be appendicitis.	Abdominal.	Teratoma with sarcomatous degeneration.	Operation, July 28, 1904.	Toxins begun 2 months after operation as prophylactic continued 4 months.	Abdominal recurrence 4 months after operation.
63	44	1913	L.	No.	Clinical diagnosis: inoperable tumor of abdomen.	Abdominal.	Spindle-celled sarcoma.	Exploratory operation, March, 1913; large inoperable tumor of undescended testis.	Mesentery, omentum, left kidney involved.	Toxins 6 months, marked decrease in size; ↓ increase in weight; Nov., 1913, worse; death Dec. 4, 1913.
64	Ad.	1913	L.	No. Never fell.	Inoperable tumor.	Abdominal.		First operation, July, 1913; tumor size of cocoanut removed; 3 weeks later second operation.	Impossible to remove tumor at second operation.	Extremely rapid growth; entire course of disease less than 3 months.